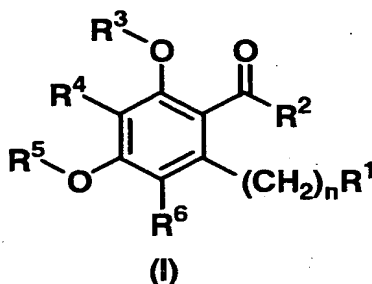


## CLAIMS

1. A heat shock protein 90 (Hsp90) family protein inhibitor comprising, as an active ingredient, a benzoyl compound represented by general formula (I):



[wherein

$n$  represents an integer of 0 to 10;

$R^1$  represents a hydrogen atom, hydroxy, cyano, carboxy, nitro, halogen, substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkenyl, substituted or unsubstituted lower alkynyl, substituted or unsubstituted lower alkoxy, substituted or unsubstituted cycloalkyl, substituted or unsubstituted lower alkoxycarbonyl, substituted or unsubstituted lower alkanoyloxy, substituted or unsubstituted heterocyclic alkyl, substituted or unsubstituted aryl, substituted or unsubstituted arylsulfonyl, a substituted or unsubstituted heterocyclic group,  $CONR^7R^8$  (wherein  $R^7$  and  $R^8$ , which may be the same or different, each represent a hydrogen atom, substituted or unsubstituted lower alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted lower alkanoyl, substituted or unsubstituted aryl, a substituted or unsubstituted heterocyclic group, substituted or unsubstituted aralkyl, substituted or unsubstituted heterocyclic alkyl, or substituted or unsubstituted aroyl, or  $R^7$  and  $R^8$  form a substituted or

unsubstituted heterocyclic group together with the adjacent nitrogen atom) or  $\text{NR}^9\text{R}^{10}$  (wherein  $\text{R}^9$  and  $\text{R}^{10}$  have the same meanings as the above  $\text{R}^7$  and  $\text{R}^8$ , respectively);

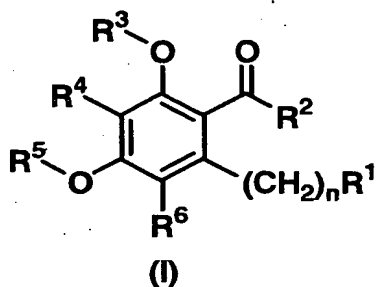
5  $\text{R}^2$  represents substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkenyl, substituted or unsubstituted lower alkynyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted aryl, or a substituted or  
10 unsubstituted heterocyclic group;

$\text{R}^3$  and  $\text{R}^5$ , which may be the same or different, each represent a hydrogen atom, substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkenyl, substituted or  
15 unsubstituted lower alkanoyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted aralkyl, or substituted or unsubstituted aroyl; and

$\text{R}^4$  and  $\text{R}^6$ , which may be the same or different, each represent a hydrogen atom, hydroxy, halogen, cyano,  
20 nitro, substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkenyl, substituted or unsubstituted lower alkynyl, substituted or unsubstituted lower alkoxy, substituted or unsubstituted cycloalkyl, amino, lower alkylamino,  
25 di-lower alkylamino, carboxy, substituted or unsubstituted lower alkoxycarbonyl, substituted or unsubstituted lower alkanoyl, substituted or unsubstituted aryloxy, substituted or unsubstituted aryl, a substituted or unsubstituted heterocyclic  
30 group, substituted or unsubstituted aralkyl, or substituted or unsubstituted heterocyclic alkyl] or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

35 2. An Hsp90 family protein inhibitor comprising, as an active ingredient, a benzoyl compound represented

by general formula (I):



(wherein  $n$ ,  $R^1$ ,  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$  and  $R^6$  each have the same meanings as defined above) or a pharmaceutically acceptable salt thereof.

3. The Hsp90 family protein inhibitor according to claim 1 or 2, wherein  $R^1$  is a hydrogen atom, hydroxy, cyano, carboxy, nitro, halogen, substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkynyl, substituted or unsubstituted lower alkoxy, substituted or unsubstituted cycloalkyl, substituted or unsubstituted lower alkoxycarbonyl, substituted or unsubstituted lower alkanoyloxy, substituted or unsubstituted heterocyclic alkyl, substituted or unsubstituted aryl, substituted or unsubstituted arylsulfonyl,  $CONR^7R^8$  (wherein  $R^7$  and  $R^8$  each have the same meanings as defined above) or  $NR^9R^{10}$  (wherein  $R^9$  and  $R^{10}$  each have the same meanings as defined above).

20

4. The Hsp90 family protein inhibitor according to claim 1 or 2, wherein  $R^1$  is substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkynyl, substituted or unsubstituted lower alkoxy, substituted or unsubstituted cycloalkyl, substituted or unsubstituted lower alkoxycarbonyl, substituted or unsubstituted heterocyclic alkyl, substituted or unsubstituted aryl,  $CONR^7R^8$  (wherein  $R^7$  and  $R^8$  each have the same meanings as defined above) or  $NR^9R^{10}$  (wherein  $R^9$

25

and R<sup>10</sup> each have the same meanings as defined above).

5        5.        The Hsp90 family protein inhibitor according to claim 1 or 2, wherein R<sup>1</sup> is CONR<sup>7</sup>R<sup>8</sup> (wherein R<sup>7</sup> and R<sup>8</sup> each have the same meanings as defined above).

10       6.        The Hsp90 family protein inhibitor according to any one of claim 1 to 5, wherein R<sup>2</sup> is substituted or unsubstituted aryl or a substituted or unsubstituted aromatic heterocyclic group.

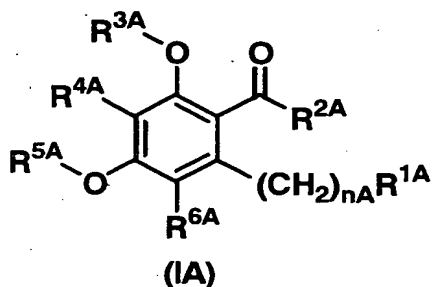
15       7.        The Hsp90 family protein inhibitor according to any one of claim 1 to 6, wherein R<sup>4</sup> is a hydrogen atom, hydroxy or halogen.

20       8.        The Hsp90 family protein inhibitor according to any one of claim 1 to 7, wherein R<sup>3</sup> and R<sup>5</sup>, which may be the same or different, each are a hydrogen atom, substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkenyl, substituted or unsubstituted lower alkanoyl, or substituted or unsubstituted aroyl.

25       9.        The Hsp90 family protein inhibitor according to any one of claim 1 to 6, wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> each are a hydrogen atom.

30       10.       The Hsp90 family protein inhibitor according to any one of claim 1 to 9, wherein R<sup>6</sup> is a hydrogen atom, lower alkyl, halogen or aryl.

11.       A benzoyl compound represented by general formula (IA):



[wherein

$nA$  represents an integer of 1 to 5;

$R^{1A}$  represents substituted or unsubstituted lower alkyl,  
 5 substituted or unsubstituted lower alkoxy, substituted  
 or unsubstituted cycloalkyl, substituted or  
 unsubstituted lower alkoxycarbonyl, substituted or  
 unsubstituted heterocyclic alkyl, substituted or  
 10 unsubstituted aryl,  $CONR^7R^8$  (wherein  $R^7$  and  $R^8$  each  
 have the same meanings as defined above) or  $NR^9R^{10}$   
 (wherein  $R^9$  and  $R^{10}$  each have the same meanings as  
 defined above);

$R^{2A}$  represents substituted or unsubstituted aryl or a  
 15 substituted or unsubstituted aromatic heterocyclic  
 group;

$R^{3A}$  and  $R^{5A}$ , which may be the same or different, each  
 represent a hydrogen atom, substituted or  
 unsubstituted lower alkyl, substituted or  
 unsubstituted lower alkenyl, substituted or  
 20 unsubstituted lower alkanoyl, substituted or  
 unsubstituted cycloalkyl, substituted or unsubstituted  
 aralkyl, or substituted or unsubstituted aroyl;

$R^{4A}$  represents a hydrogen atom, hydroxy or halogen; and  
 $R^{6A}$  represents a hydrogen atom, halogen, cyano, nitro,  
 25 substituted or unsubstituted lower alkyl, substituted  
 or unsubstituted lower alkenyl, substituted or  
 unsubstituted lower alkynyl, substituted or  
 unsubstituted lower alkoxy, substituted or  
 unsubstituted cycloalkyl, amino, lower alkylamino, di-  
 30 lower alkylamino, carboxy, substituted or

unsubstituted lower alkoxy carbonyl, substituted or unsubstituted lower alkanoyl, substituted or unsubstituted aryloxy, substituted or unsubstituted aryl, a substituted or unsubstituted heterocyclic group, substituted or unsubstituted aralkyl, or substituted or unsubstituted heterocyclic alkyl; provided that:

(i) when  $R^{3A}$  and  $R^{5A}$  each are methyl,  $R^{4A}$  and  $R^{6A}$  each are a hydrogen atom, and

$-(CH_2)_{nA}R^{1A}$  is

(a) methoxycarbonylmethyl,

$R^{2A}$  is not a group selected from the group consisting of 2,4,6-trimethoxy-5-methoxycarbonyl-3-nitrophenyl, 3-cyano-2,4,6-trimethoxyphenyl, 5-cyano-2-ethoxy-4,6-dimethoxy-3-nitrophenyl, 2,6-dimethoxyphenyl, 2-chloro-6-methoxyphenyl and 2-chloro-4,6-dimethoxy-5-methoxycarbonyl-3-nitrophenyl,

(b) ethoxycarbonylmethyl;

$R^{2A}$  is not 2,4,6-trimethoxy-3-methoxycarbonylphenyl, and

(c) N,N-dimethylaminomethyl,

$R^{2A}$  is not phenyl;

(ii) when  $R^{3A}$ ,  $R^{4A}$ ,  $R^{5A}$  and  $R^{6A}$  each are a hydrogen atom, and  $-(CH_2)_{nA}R^{1A}$  is

(a) 2-(acetoxymethyl)heptyl, 3-oxopentyl or pentyl,

$R^{2A}$  is not 6-hydroxy-4-methoxy-3-methoxycarbonyl-2-pentylphenyl,

(b) 3-oxopentyl,

$R^{2A}$  is not a group selected from the group consisting of 3-benzyloxycarbonyl-6-hydroxy-4-methoxy-2-pentylphenyl and 3-carboxy-6-hydroxy-4-methoxy-2-pentylphenyl, and

(c) n-propyl,

$R^{2A}$  is not 2,4-dihydroxy-6-[(4-hydroxy-2-oxopyran-6-yl)methyl]phenyl;

(iii) when  $R^{3A}$  and  $R^{4A}$  each are a hydrogen atom,  $R^{5A}$  is methyl,  $R^{6A}$  is methoxycarbonyl, and  $-(CH_2)_{nA}R^{1A}$  is pentyl;

5  $R^{2A}$  is not a group selected from the group consisting of 6-[2-(acetoxymethyl)heptyl]-2,4-dihydroxyphenyl, 2,4-dihydroxy-6-pentylphenyl and 2,4-dihydroxy-6-(3-oxopentyl)phenyl;

10 (iv) when  $R^{3A}$  and  $R^{5A}$  each are benzyl,  $R^{4A}$  and  $R^{6A}$  each are a hydrogen atom, and  $-(CH_2)_{nA}R^{1A}$  is 3-oxopentyl;

$R^{2A}$  is not a group selected from the group consisting of 6-benzyloxy-4-methoxy-3-methoxycarbonyl-2-pentylphenyl and 6-benzyloxy-3-benzyloxycarbonyl-4-methoxy-2-pentylphenyl;

15 (v) when  $R^{3A}$  is benzyl,  $R^{4A}$  is a hydrogen atom,  $R^{5A}$  is methyl,  $-(CH_2)_{nA}R^{1A}$  is pentyl, and  $R^{6A}$  is methoxycarbonyl or benzyloxycarbonyl,

20  $R^{2A}$  is not 2,4-bis(benzyloxy)-6-(3-oxopentyl)-phenyl;

(vi) when  $R^{3A}$  and  $R^{4A}$  each are a hydrogen atom,  $R^{5A}$  is methyl,  $-(CH_2)_{nA}R^{1A}$  is pentyl, and  $R^{6A}$  is carboxy or benzyloxycarbonyl,

25  $R^{2A}$  is not 2,4-dihydroxy-6-(3-oxopentyl)phenyl; and

(vii) when  $R^{3A}$ ,  $R^{4A}$  and  $R^{6A}$  each are a hydrogen atom,  $R^{5A}$  is n-propyl, and  $-(CH_2)_{nA}R^{1A}$  is 5-(1,1-dimethylpropyl)-4-(2-hydrobenzotriazol-2-yl)-2-hydroxyphenylmethyl,

30  $R^{2A}$  is not phenyl] or a pharmaceutically acceptable salt thereof.

12. The benzoyl compound according to claim 11, wherein  $R^{2A}$  is a substituted or unsubstituted aromatic heterocyclic group, substituted aryl having 1 to 3 substituents, or aryl, or a pharmaceutically acceptable salt thereof.

13. The benzoyl compound according to claim 11 or 12, wherein  $R^{3A}$  and  $R^{5A}$ , which may be the same or different, each are a hydrogen atom, substituted or unsubstituted lower alkyl, substituted or unsubstituted lower alkanoyl, substituted or unsubstituted aroyl, or substituted or unsubstituted lower alkenyl, or a pharmaceutically acceptable salt thereof.

14. The benzoyl compound according to claim 11 or 12, wherein  $R^{3A}$ ,  $R^{4A}$  and  $R^{5A}$  each are a hydrogen atom, or a pharmaceutically acceptable salt thereof.

15. The benzoyl compound according to any one of claim 11 to 14, wherein  $R^{1A}$  is  $CONR^7R^8$  (wherein  $R^7$  and  $R^8$  each have the same meanings as defined above), or a pharmaceutically acceptable salt thereof.

16. The benzoyl compound according to any one of claim 11 to 15, wherein  $R^{6A}$  is a hydrogen atom, lower alkyl, halogen or aryl, or a pharmaceutically acceptable salt thereof.

17. A pharmaceutical composition comprising, as an active ingredient, the benzoyl compound according to any one of claim 11 to 16 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

18. A pharmaceutical composition comprising, as an active ingredient, the benzoyl compound according to any one of claim 11 to 16 or a pharmaceutically acceptable salt thereof.

19. An Hsp90 family protein inhibitor comprising, as an active ingredient, the benzoyl compound according



to any one of claim 11 to 16 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

5           20. An Hsp90 family protein inhibitor comprising, as an active ingredient, the benzoyl compound according to any one of claim 11 to 16 or a pharmaceutically acceptable salt thereof.

10           21. A therapeutic agent for a disease associated with an Hsp90 family protein or a protein to which an Hsp90 family protein binds (Hsp90 client protein) comprising, as an active ingredient, the benzoyl compound according to any one of claim 11 to 16 or a prodrug  
15 thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

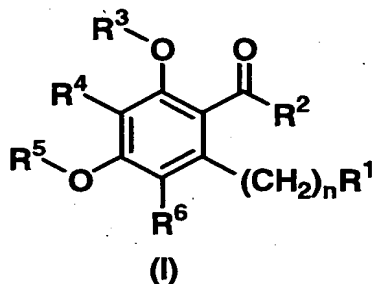
          22. A therapeutic agent for diseases associated with an Hsp90 family protein or a protein to which an  
20 Hsp90 family protein binds (Hsp90 client protein) comprising, as an active ingredient, the benzoyl compound according to any one of claim 11 to 16 or a pharmaceutically acceptable salt thereof.

25           23. An anti-tumor agent comprising, as an active ingredient, the benzoyl compound according to any one of claim 11 to 16 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

30           24. An anti-tumor agent comprising, as an active ingredient, the benzoyl compound according to any one of the above (11) to (16) or a pharmaceutically acceptable salt thereof.

35           25. A method of inhibiting a heat shock protein

90 (Hsp90) family protein, which comprises administering an effective amount of a benzoyl compound represented by general formula (I):

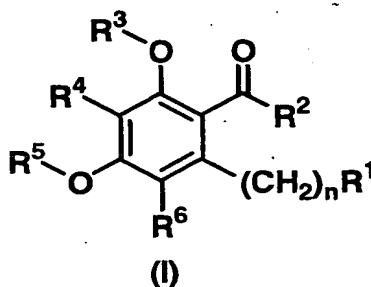


5 (wherein n, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> each have the same meanings as defined above) or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

10 26. A method of treating a disease associated with an Hsp90 family protein or a protein to which an Hsp90 family protein binds (Hsp90 client protein), which comprises administering an effective amount of the benzoyl compound according to any one of claim 11 to 16  
15 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

27. A method of treating malignant tumors, which comprises administering an effective amount of the  
20 benzoyl compound according to any one of claim 11 to 16 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug.

28. Use of a benzoyl compound represented by  
25 general formula (I):



(wherein n, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> each have the same meanings as defined above) or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound  
 5 or said prodrug for the manufacture of a heat shock protein 90 (Hsp90) family protein inhibitor.

29. Use of the benzoyl compound according to any one of claim 11 to 16 or a prodrug thereof, or a  
 10 pharmaceutically acceptable salt of said benzoyl compound or said prodrug for the manufacture of an Hsp90 family protein inhibitor.

30. Use of the benzoyl compound according to any  
 15 one of claim 11 to 16 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound or said prodrug for the manufacture of a therapeutic agent for diseases associated with an Hsp90 family protein or a protein to which an Hsp90 family protein  
 20 binds (Hsp90 client protein).

31. Use of the benzoyl compound according to any one of claim 11 to 16 or a prodrug thereof, or a pharmaceutically acceptable salt of said benzoyl compound  
 25 or said prodrug for the manufacture of an anti-tumor agent.